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nation and right ascension, the co-ordinates by which they are catalogued in the lists giving the names and magnitudes of stars. The navigator is thus rendered independent of any previous knowledge of the constellations and the names of the stars he may observe, and, instead of being confined to the employment in his observations of those stars which he may be able to recognize, is enabled to identify any star that is bright enough to observe.

MAXIMUM, MINIMUM AND AVERAGE HYDROGRAPHS OF THE MISSISSIPPI RIVER*

BY

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The diagrams presented with this paper represent composite hydrographs of the Mississippi river at five stations and were compiled from the comprehensive hydrographs of the river from the time when the records were first tabulated to the present as printed in the Report of the Mississippi River Commission for the year ending June 30, 1909. In each illustration, the upper curve represents the absolute maximum stage of the river for the location; the lower curve, the absolute minimum; and the continuous line the average hydrograph. Figure 1 portrays the stages at Hannibal, Mo., on the Mississippi river; Figure 2, stages at Hermann, Mo., on the Missouri river; Figure 3, at St. Louis just below the confluence of the Upper Mississippi and the Missouri river; Figure 4, at Cairo, Illinois, on the Ohio river; and Figure 5, at Memphis, Tennessee, where the combined effect of the upper rivers is recorded.

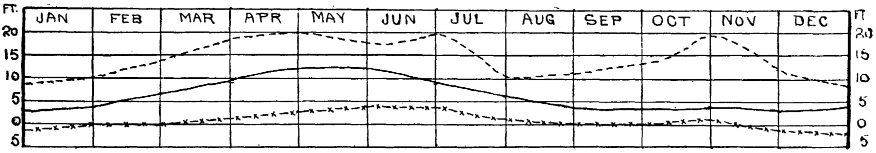

FIG. 1.

Figure 1. Hannibal. 329.4 miles above Cairo. Zero of gage is 469.60 feet above the Cairo Datum plane. These curves are taken

from the records for twenty years, from 1879 to 1889. The average crest of the flood appears in May, a condition which arises from the Upper Missouri type of rainfall. This crest has arrived as early as the last of April and as late as July 1, and there has been a range of 16 feet during the twenty years. Exceptional occurrences may always arise as is indicated by the excessive height of the maximum curve during October and November. This departure from uniformity resulted from the high water stages during the fall of 1881.

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* Paper read before the Association of American Geographers at Boston, January, 1910.

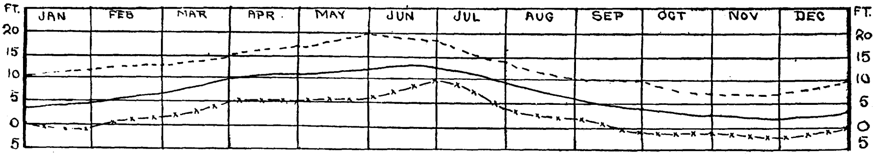

FIG. 2.

Figure 2. Hermann. Zero of gage is 502.17 feet above the Cairo Datum plane. These curves represent the same period of time as that of the Hannibal record. The average crest is seen to appear about June 20, a little later than that of the Upper Mississippi, and this flood is a result of the Lower Missouri type of rainfall. The 1897 season is represented on these curves by the absolute maximum for January 1 and April 1, and the absolute minimum for the months from August until the close of the year.

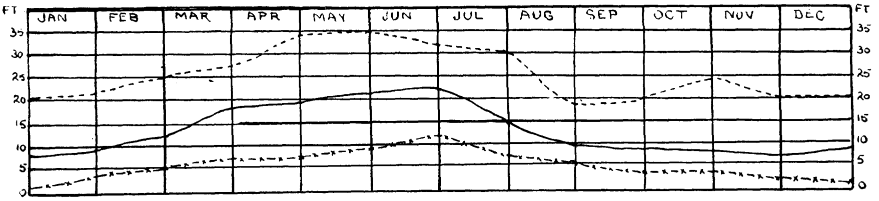

FIG. 3.

Figure 3. St. Louis. 190.8 miles above Cairo. Zero of gage is 400.22 feet above the Cairo Datum plane. These curves cover a period of twenty-nine years, from 1871 to 1899. The crest of the St. Louis flood, which is made up of a combination of the Missouri and Upper Mississippi river floods, is reached on the average during the last of June. In the absolute maximum we have a marked deviation in the October-November portion of the curve which is only in part explained by the corresponding excess in the Hannibal absolute

maximum curve. While the November 1 position of the absolute maximum curve is the result of the 1881 rise on the Upper Mississippi, the October 1 position has for its origin a combination of rises on the two tributary rivers during 1884. The high water of 1895 corresponds nearly with the absolute minimum curve for the months from January to July, and the entire absolute minimum curve does not differ much from the hydrograph for that year.

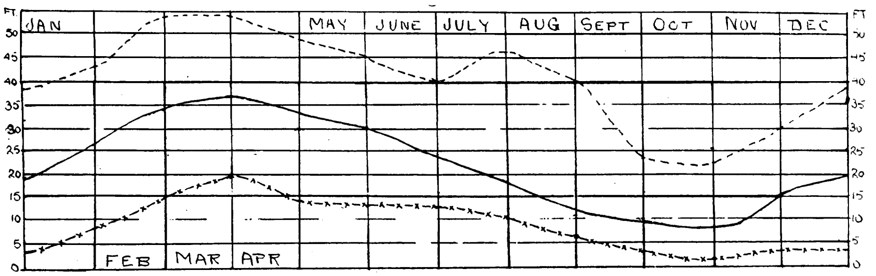

FIG. 4.

Figure 4. Cairo. 1 mile above Cairo. Zero of gage is 290.84 feet above the Cairo Datum plane. These curves cover a period of twenty-eight years from 1872 to 1899. The crest of this flood arrives on the average during March and results from the early winter rains in the Southern Appalachians. The excess in the absolute maximum during August and September is the record of the season of 1875. One other record for August approaches within thirteen feet of the August, 1875 record but no other reaches within twenty-one feet of it. At this station, during the twenty-eight years, the range of the season below average low water mark extends from August 15 to February 1. The 1894 low water season practically coincides with this minimum stage. The beginning of the high water season here may come as early as the last of October or be delayed until the first of January. On the other hand, stages above the average high water mark may be maintained from the last of December until early in September.

This uncertainty of the river stages at Cairo is a reflection of similar conditions among the tributaries of the Ohio, and offers a serious embarrassment to any effort towards impounding the waters in reservoirs.

Figure 5. Memphis. 230 miles below Cairo. Zero of gage is 184.27 feet above mean Gulf level (Cairo Datum is approximately 19.7 feet below mean Gulf level). These curves represent the combination of the floods of the three tributaries on the lower river. Stages below the average low water mark are recorded from the last of July until the last of February, a period of seven months; while stages above the average high water mark are shown from the last of November until the middle of August, over eight months. The lowest stages are recorded during October and November, and the highest during March and April. The high water rise may begin as early as November 1 or be delayed until March 1. A consistent fall in stage during August and September and a consistent rise during March are also recorded.

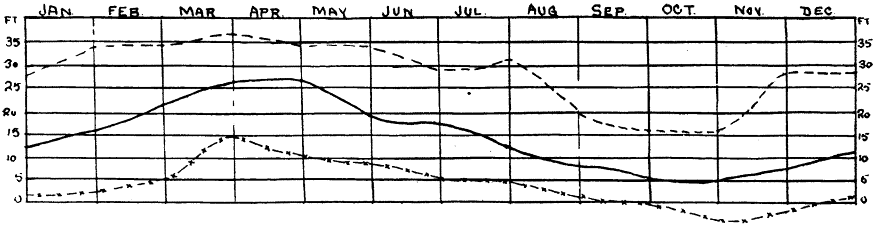

FIG. 5.

RECENT PUBLICATIONS OF THE WEATHER BUREAU

BY

R. DeC. WARD

The new series of publications dealing with the climatology of the United States, issued by the Weather Bureau, includes a number of bulletins. A ten-page summary of the climatological data for Maine ("Section 106," in the new classification), contains a brief account of the "climatic characteristics" of New England as a whole, with special reference to Maine; a series of tables of monthly and annual rainfalls for 22 stations (running back in one case to the year 1837); miscellaneous data, including average number of days with .01 inch or more of precipitation, mean temperatures, highest and lowest temperatures by months, average depth of snowfall, mean relative humidity, prevailing wind direction, and frost data; hydrographic data compiled from the records of the U. S. Geological Survey; a chart showing the comparative monthly distribution of precipitation for certain New England stations, and a map showing the boundaries